

- Commissioned officers must be branch-qualified and hold the rank of captain.
- All applicants must submit any past or current medical waivers with the application packet to determine the ability to meet Naval aeromedical flight requirements.
- Applicants must ensure that they are confident swimmers capable of passing Navy swim test requirements.

Any questions or comments pertaining to the Army XTP Board or career management can be directed to MAJ Sharlene Donovan, AAC Assignments Officer, at (703) 325-5479, DSN 221-5479 or by e-mail at [sharlene.donovan@hoffman.army.mil](mailto:sharlene.donovan@hoffman.army.mil).

## News Briefs

### ARL MSRC Increases Computer Capability

The U.S. Army Research Laboratory Major Shared Resource Center (ARL MSRC) in Adelphi, MD, one of DOD's four supercomputing sites for its High Performance Computing Modernization Office (HPCMO), announced that it is increasing its computing capability from 9.1 trillion to 36 trillion floating-point operations (TFLOPS) by adding three computing systems to its already robust spectrum. The added power will make the ARL MSRC one of DOD's

largest computing centers, an investment estimated at \$20 million.

"This increase in computing capability will give DOD scientists and engineers the ability to solve complex, 3-D, time-dependent, physics-based problems in a timeframe that can provide the data necessary to assist with weapon development and procurement decisions," said Charles J. Nietubicz, Acting Deputy Director, Computational and Information Sciences Directorate (CISD).

The three systems, which are the first major commodity-based symmetric multiprocessor supercomputers used in the HPCMO, will be introduced at ARL this summer. The most powerful of the new systems, a 2,132-central processing unit (CPU) Linux NetworX Evolocivity II® system, will increase ARL MSRC computational capability by more than 15 TFLOPS. The system will consist of 1,066 nodes, each equipped with two Intel® Xeon™ 3.6-GHz processors, 1.5 GB of memory per CPU and will use the Myrinet™ interconnect. This system will be ranked as one of the top 10 most powerful computer systems in the world.

A second system, a 2,304-CPU cluster from IBM®, will comprise 1,152 dual-2.2 GHz AMD Opteron™ processors and a Myrinet interconnect. The system will increase ARL MSRC computational capability by more than 10 TFLOPS. This system will also have a top 10 world-computer system ranking.

The third system, a Silicon Graphics® 256 processor single system image SGI® Altix® system with SGI NUMalink™ interconnect, will add an additional 2 TFLOPS to the high-performance computing (HPC) environment.

Raytheon engineers will work with government partners to integrate, install, test and transition these new systems for production use by fiscal year end. This acquisition and system integration will be the HPCMO's first major introduction into the commodity space, and ARL will be the program leader in production commodity clusters. With these upgrades, ARL will become the first and only center in the HPCMO providing greater than 10 terabytes (10,000 GB) of memory.

"The ARL MSRC serves a diverse, technically challenging HPC user population," said Denise P. Brown, Acting ARL MSRC Center Director. "The selection of Linux NetworX, IBM and SGI systems provides the flexibility to meet users' diverse challenges."



CISD Acting Deputy Director Charles J. Nietubicz stands near several computers in the Scientific Visualization Laboratory at Aberdeen Proving Ground, MD. U.S. Army photo by Brian Simmonds, ARL MSRC Outreach Teams.

Established in 1996, ARL MSRC helps DOD focus and exploit HPC technology for military advantage across the battlespace. This customer-focused, world-class computational facility supports DOD's research and development, science and technology and test and evaluation communities with some of the world's newest, scalable, parallel computers. These supercomputers feature shared and distributed memory architectures. Researchers use ARL MSRC facilities to model and simulate systems, explore chemical reactions, study and design weapon systems, analyze sensors and experimental data and develop new composite materials.

This new equipment is part of the HPCMO's Technology Insertion 2004, an initiative to modernize DOD's HPC capabilities. For more information, contact Tonya Johnson at (301) 394-4456 or [ltjohnson@arl.army.mil](mailto:ltjohnson@arl.army.mil).

### **Army Dedicates Aeromedical Research Laboratory**

The U.S. Army Aeromedical Research Laboratory (USAARL) was dedicated in memory of MG Spurgeon H. Neel, a soldier, physician, visionary and leader. The ceremony was held on April 2, 2004, at USAARL, Fort Rucker, AL. USAARL is one of the six research laboratories of the U.S. Army Medical Research and Materiel Command (MRMC), Fort Detrick, MD. MG Lester Martinez-Lopez, Commanding General (CG), MRMC, was the host. Alice Neel unveiled the bronze plaque dedicated to her late husband. The USAARL building will be named the Neel Aeromedical Science Center.

Neel was born and educated in Memphis, TN. He entered active duty in October 1943, following his internship at Methodist Hospital in Memphis. At World War II's end, Neel was a medical company commander in Europe. During the following 40 years of his career, Neel was involved in all phases of field and aviation medicine. He established a formal program for board certification in aviation medicine for Army medical officers and instituted the Army Aviation Medical Training and Research Programs.

Neel was a pioneer in developing the principles for aeromedical evacuation (aerovac) of battlefield casualties. His guidance and suggestions were implemented during the Korean conflict, resulting in increased numbers of injured soldiers aerovaced from the battlefield. Based on his experience during that conflict, he developed medical evacuation policies,

procedures and organizations that became the foundation for aeromedical operations today.

As the hostilities in Vietnam increased in the mid-1960s, then COL Neel was assigned as the Chief Surgeon, U.S. Military Assistance Command and Senior Medical Advisor to GEN William Westmoreland. Following his promotion to brigadier general in 1968, Neel became the CG, 44th Medical Brigade. After returning to the United States, Neel became the Deputy Army Surgeon General, a post he held until 1973, when he became the first Health Services Command CG.

Regarded as the Father of Army Aviation Medicine, Neel envisioned a research facility designed to provide direct aviation medical research support to all Army aviation and airborne activities. His goal was realized in 1962 when the U.S. Army Aeromedical Research Unit, Fort Rucker, was created. Neel's vision grew into today's USAARL, a center of excellence devoted to world-class research on health hazards of Army aviation, tactical combat vehicles, selected weapon systems and airborne operations.

### **CarboPack Restores Energy**

Extra energy for strenuous military operations is now conveniently supplied with the Carbohydrate Supplement Pack, or CarboPack, developed at the U.S. Army Soldier Systems Center (SSC). The CarboPack contains one carbohydrate-rich bar and two packages of flavored carbohydrate-electrolyte sports beverage powder to mix two 8-ounce servings. It is intended to complement current and future military rations.

"Studies show that Soldiers in intense, prolonged physical activity for more than 3 hours need calories beyond what's provided in rations," said Julie Edwards, a food technologist at the DOD Combat Feeding Directorate. "Most of what they need is provided in their rations," she explained. "This is designed to make up the difference in calorie needs during prolonged exercise."

The CarboPack adds another 400 calories to the battlefield diet. By comparison, a day's worth of Meals, Ready-to-Eat (MREs) is more than 3,600 calories. Research that went into the CarboPack will give troops a product that's proven to perform while saving troops money.



"We identified a need because Soldiers were buying their own bars and drinks, which opened up potential pitfalls," Edwards said. "By providing Soldiers with the right products, we can decrease the chances that they will bring the wrong type of item to the field with them that may potentially hurt their performance."

Combat Feeding's Individual Combat Ration Team, the U.S. Army Research Institute of Environmental Medicine at Natick, MA, Office of the Surgeon General and Army Center of Excellence Subsistence worked together on product guidelines. The drink mix is similar to Gatorade®, with a combination of electrolytes and carbohydrates meeting military specifications and has lower sugar content than an MRE mix, according to Edwards. Fruit punch, grape, orange and lemon-lime flavors were chosen because they are the most popular for this type of beverage, and each CarboPack holds two different flavors. Each mix is stored in a trilaminate pouch with a tear-off top used to pour in water, shake and drink so warfighters can avoid using a separate drink holder, such as their canteen cup.

"A resealable drink pouch was one of the recommendations of Soldiers from Fort Campbell, KY, and Fort Polk, LA, who participated in focus groups and evaluations, and is in development," Edwards said. "The drink pouches are folded over twice and fit inside another trilaminate pouch along with the bar wrapped in the original manufacturer's package. Chocolate and apple cinnamon HooAH! and oatmeal-raisin and chocolate bars similar to Gatorade and PowerBar® brands were chosen as the energy bars because of their nutritional content, acceptability rating in taste-testing and ability to reach at least a 2-year shelf life," Edwards explained.



"All three types in their respective flavors will be represented in the CarboPacks. Having a variety of products and flavors for the drinks and bars helps increase acceptability and consumption," Edwards continued. "HooAH! was created by Combat Feeding food scientists and is getting another opportunity to be fielded as a new commercial manufacturer has picked up the production. Another product evaluated was commercial gel, but Soldiers were concerned because the gel packs would burst inside their full rucksacks," Edwards remarked. "They will be considered again when product packaging has improved," she concluded.

The first 42,000 CarboPacks were scheduled for delivery to Iraq in early 2004. For more information on CarboPacks or SSC, visit our Web site at <http://www.natick.army.mil>.

## COL Elias Nimmer Awarded Purple Heart

*Donna Miles*

Deputy Secretary of Defense Paul Wolfowitz presented the Purple Heart to U.S. Army COL Elias Nimmer at the Pentagon during a ceremony held March 26, 2004. Nimmer was seriously wounded when the Baghdad hotel he was staying in came under attack by Iraqi insurgents last October.

Wolfowitz, who was also staying at the Al Rasheed Hotel during the Oct. 26 attack, met COL Nimmer at the 28th Combat Support Hospital, where Nimmer and four others who worked for the Coalition Provisional Authority were treated for serious injuries from the attack. Nimmer was the only service member hospitalized. Another soldier, LTC Charles H. Buehring from Army Central Command Headquarters (Forward), was killed during the attack.

As Wolfowitz presented Nimmer the Purple Heart, he recalled how inspired he had been by Nimmer's commitment to the coalition mission in Iraq.

When the two men first met, Nimmer was being administered oxygen and was receiving treatment for shrapnel injuries to his spine, nerve damage and a perforated eardrum. Wolfowitz said he asked Nimmer, a native of Beirut, Lebanon, how he felt about rebuilding a new Middle East. Nimmer, who asked the medical staff to remove his oxygen mask so he could meet the deputy secretary, responded with a "thumbs up," Wolfowitz said.





Deputy Secretary of Defense Paul Wolfowitz presented the Purple Heart to COL Elias Nimmer for injuries he sustained when Iraqi insurgents attacked the Baghdad hotel where both men were staying Oct. 26, 2003. U.S. Army photo by Robert Ward.

Nimmer's wife, Leann, said she attributes her husband's up-bringing in a war-torn country with giving him the instinct to immediately roll from his bed onto the floor when the first rockets hit the hotel just after 6 a.m. He remained face-down on the floor as a barrage of rockets hit the hotel, one impacting directly inside his room.

During the ceremony, Wolfowitz praised Nimmer as an example of the "tremendous courage" that all members of the Armed Forces exhibit on a daily basis as they take the front lines in the war on terror. Nimmer, a Medical Service Corps officer, deployed to Iraq in June to serve as an adviser to Iraq's Ministry of Health.

Wolfowitz said Nimmer also typifies the "extraordinary contributions" immigrants have brought to the United States and to the U.S. military.

"This is a day I will remember as long as I live," said Nimmer as he accepted his Purple Heart. He thanked his co-workers within the Office of the Assistant Secretary of the Army for Acquisition, Logistics and Technology for their support, and the medical community for its part in his recovery.

"After I realized that I couldn't move, I knew that I would be taken care of, and I was," he said.

Air Force LTC John Bowersox, Nimmer's roommate at the Al Rasheed Hotel who was away from Baghdad on the day of the attack, praised the staff at the 28th Combat Support Hospital for providing quick, decisive care that has enabled Nimmer to walk today. Bowersox, a physician also working with the Iraqi Ministry of Health at the time of the attack, particularly credited LTC Rocco Armonda

for conducting surgery immediately to remove shrapnel from Nimmer's spine.

Nimmer was taken to Landstuhl Army Medical Center in Germany the night of the attack and continued to receive treatment at Walter Reed Army Medical Center in Washington, DC. Following three successful surgeries, Nimmer is back to work at the Pentagon.

*Donna Miles is a writer for the American Forces Press Service.*

## Developmental Robot Helps Save Soldiers' Lives

*Paul D. Mehney and Rae Higgins*

U.S. Army Tank-Automotive Research, Development and Engineering Center (TARDEC) researchers are in the U.S. Central Command's area of operations fielding advanced prototype robots designed to perform standoff vehicle inspections that will help protect U.S. Soldiers from improvised explosive devices and other contraband.

TARDEC scientists lead the Omni-Directional Inspection System (ODIS) program, an Army initiative to create a family of standoff inspection tools to enhance Soldier survivability and provide a variety of homeland defense applications.

Two TARDEC Department of the Army civilian engineers, in conjunction with the Army's Rapid Equipping Force

TARDEC is fielding an advanced prototype robot that can perform standoff vehicle inspections at a checkpoint in Iraq.



(REF), have fielded 10 advanced ODIS prototypes to units deployed in Iraq and Afghanistan. They will spend 2 months training Soldiers slated to use the system and collect operational data and lessons learned for integrating improvements into next-generation prototypes.

Equipped with a color TV camera and infrared capabilities, ODIS performs undervehicle inspections to detect explosives and contraband. In the future, ODIS will detect radiological, biological and chemical elements as well. Lead TARDEC engineer for the ODIS project, William Smuda, states that ODIS enables Soldiers to perform inspections from a safe standoff distance rather than using "mirrors on sticks." ODIS will eliminate the need for Soldiers having to perform up-close inspections themselves and will ultimately help bring them home alive.

In Iraq, the robots are being used to augment both local Iraqi security forces and U.S. Soldiers at checkpoints around the Coalition Forces-controlled Green Zone. TARDEC engineers have been on hand since the first day ODIS arrived in Iraq. According to Smuda, Soldiers learned how to operate ODIS in less than an hour and were soon inspecting cars from a standoff location.

Once the robots were in use, TARDEC engineers worked with Soldiers to fix any unexpected problems. It was soon discovered that the suspensions on many Iraqi vehicles were worn down to the point that the car's undercarriage barely cleared the pavement, which didn't allow enough room for the 4-inch-tall ODIS to operate under them. TARDEC's engineers called their laboratory in Michigan, and after collaboration soon found that moving an antenna would fix the problem. Being able to observe the situation firsthand and then communicate with TARDEC's laboratory staff and project lead provided a quick fix and minimized downtime.

After encountering problems in the field, TARDEC engineers relayed data to the ODIS team in Michigan. Team members then placed the data into an advanced collaborative environment (ACE) allowing engineers and support staff to view the problem and quickly find a solution. ODIS Project Lead Henry Andrusz at TARDEC said "TARDEC's ACE process allows all team members to access project information at any time and track events quickly to solve problems as they occur. The process is working well, enabling us to quickly provide critical support to the Soldier in real time."

ODIS combines omnidirectional drive technology and robotic operations to allow users to precisely place the unit for close looks. Weighing a mere 40 pounds, ODIS is

man-packable and operates on a single charge via a nickel-cadmium Single Channel Ground and Airborne Radio System military pack battery for up to 2 hours.

"This is an example of Army research and development (R&D) at its best," Smuda said. "We took ODIS out of the R&D pipeline on Sept. 12, 2001, and have worked hard to transition it to the field ever since." Smuda is confident ODIS will prove beneficial in increasing Soldier survivability.

In addition to Soldiers using ODIS in Iraq and Afghanistan, TARDEC recently partnered with Virginia law enforcement officials. They are using ODIS to augment the security inspections associated with the Washington, DC, sniper trial. TARDEC is also partnering with national port authorities to explore homeland security applications, including airport and seaport inspections, hazardous substance detection and preliminary area surveillance during first-responder situations.

TARDEC's ODIS program partners include the DOD Joint Robotics Program Office, technical research partner Utah State University and prototype manufacturer Kuchera Defense Systems.

ODIS' future plans include integrating lessons learned in Iraq and Afghanistan on the next design spiral for the robot platform. These lessons, along with Soldier feedback, will also allow TARDEC robotics engineers to use similar technology to enhance other robot platforms to keep Soldiers out of harm's way wherever possible.

*Paul D. Mehney is a Marketing Specialist with TARDEC's Operations Business Group.*

*Rae Higgins is employed as a contractor by TARDEC's Research Business Group. She is an Army public affairs school graduate.*

## Microwaves Improve Processed Food Quality

Microwave energy, long used in homes to cook or reheat food, is gaining momentum in the United States as a method for processing more palatable shelf-stable foods for the military and commercial markets. These shelf-stable products are already successfully used overseas as an alternative to frozen or refrigerated packaged foods. The DOD Combat Feeding Directorate, Soldier Systems Center (SSC)



A Soldier eats an MRE near a mosque being built at Al Monsour Baghdad, Iraq. U.S. Marine Corps photo by SSGT Ricky A. Bloom.

NEWS BRIEFS

in Natick, MA; Washington State University (WSU) in Pullman, WA; and several food processing, equipment and packaging companies have formed a partnership to process food through a microwave sterilization system. The partnership is backed by federal and private-sector funding.

The microwave sterilization project commenced in 2000 under the federal government's Dual Use Science and Technology program with packaged food giants Kraft Foods Inc. and Hormel Foods, and Truitt Brothers Inc., a food processing company. Packaging and equipment companies Rexam Containers, Graphic Packaging and Ferrite Components were also invited to join the project. Since then, Ocean Beauty Seafoods Inc. and Mars Inc. have joined the initiative to raise the quality of processed Alaska salmon and other traditionally processed food products.

Designed and located at WSU, the pilot-scale microwave system has successfully demonstrated the capability, and will now be able to take the next step — creating a preproduction plant for a larger-scale operation to research military and commercial foods, study shelf life and work on gaining approval from the Food and Drug Administration (FDA).

Unlike home microwave ovens, the microwave sterilization system is high-powered and treats prepackaged food submerged in water, allowing the microwaves to penetrate and uniformly cook packaged foods from the inside out, preventing burning around the

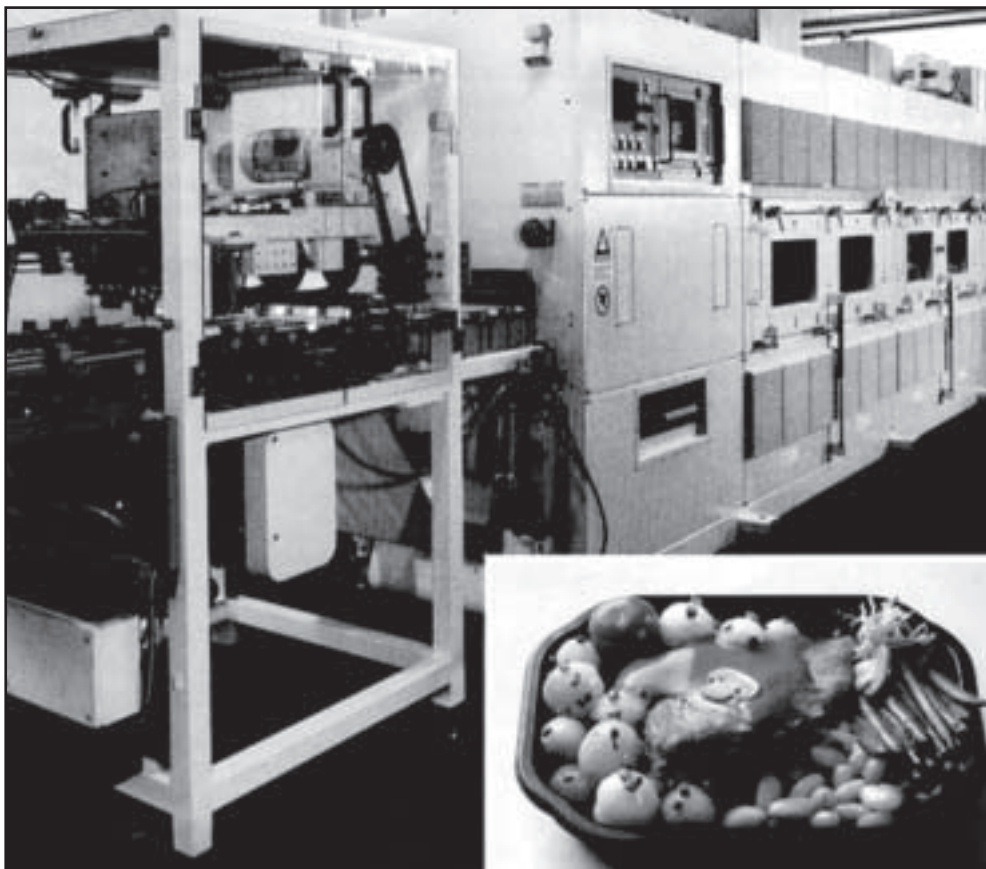
edges. To kill all bacteria quickly without damaging the food's texture or flavor, the package is sealed before cooking.

"We're talking about a quantum leap in food quality," said Tom Yang, a senior food technologist at the SSC Combat Feeding Directorate, comparing the new process to conventional retort processing, which is currently used for the Meal, Ready-to-Eat (MRE) entrees, tray rations and most canned commercial foods.

Microwave sterilization is a high-temperature, short-duration form of processing. Instead of retort's 250 degrees F for 90 minutes, the microwave cooks at 265 degrees F in 10 minutes.

"We can introduce a larger variety of foods to warfighters and improve products currently fielded," Yang said. "We'll be able to introduce a lot of products that we currently can't with retorting. The MRE menu of 24 different entrees is continually being improved to keep only the best items," Yang remarked.

Certain foods were out of the question until microwave sterilization. "A challenge to us is to have a whole muscle product that looks and tastes like a freshly broiled fillet,"



A commercial microwave sterilization system in Europe continuously processes packaged foods for consumers.



said Patrick Dunne, Senior Technical Advisor at the Combat Feeding Directorate. "With retorting, it often ends up being tough and overcooked in the process of killing bacteria. We also see this technology as doing a really great job with seafood and other products, such as macaroni and cheese, scrambled eggs and mashed potatoes," Dunne continued.

Besides quicker processing and improved quality, other microwave sterilization advantages are preserving nutritional benefits that are degraded during retort and less need for freezers or refrigerators in the field.

First developed in the 1990s at WSU and led by Juming Tang, a professor in WSU's Department of Biological Systems Engineering, Natick food technologists contributed to the project by helping solve the problems of uneven heating and heat distribution monitoring. They also provided technical advice on quality and sensory evaluation. "The companies [in the project] are bringing their expertise in marketing to reach out to consumers with products people want," Yang commented. "We can tailor the energy distribution appropriate to each different food in a tray to have the ultimate quality," Yang said. "Although promising, the technology presents some challenges."

"Formulation and preparation by culinary specialists before microwaving are still as important as ever to food quality," Dunne emphasized. He also said that the food industry, a conservative high-volume, low-profit-margin sector, will need to be convinced that the technology is worthwhile before investing.

The microwave sterilization system now has the capacity to cook foods in small batches, but the plan is to transition to a "semicontinuous" process in the near future and, eventually, a continuous process where food packages move out nonstop as is currently being done in many other countries. Pending FDA approval and selection of a suitable packaging system, Yang said microwave processing would begin to supplement some retort-processed military rations.

For industry, highly targeted marketing campaigns will be necessary to convince consumers of shelf-stable food's appeal over conventionally-processed foods and, quite possibly, over the perceived freshness of widely-available frozen or refrigerated foods.

For more information about SSC, go to <http://www.natick.army.mil>.

## Navy Firesuit Expands Coverage



The First Attack Firesuit stores in a pillow-sized package. Loops are available to hang the firesuit at various locations around a ship.

The new First Attack Firesuit, developed by the U.S. Navy Clothing and Textile Research Facility at the U.S. Army Soldier Systems Center in Natick, MA, was driven by reduced manpower requirements for the Navy's next-generation DD(X) (a multimission surface combatant) family of ships. The firesuit resembles a dark-colored pillow until one

seam is opened to unfold a coverall-style uniform donned in about 1 minute to protect sailors responding to shipboard fires.

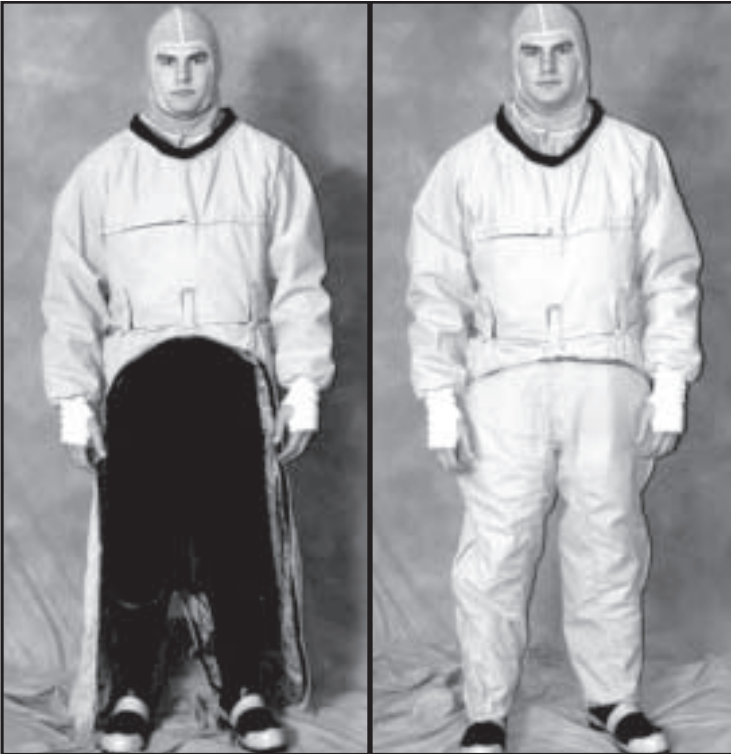
With ships at one-third manning, the Navy can't afford to have as many dedicated firefighters and will need more sailors to assist in putting out fires, said Harry Winer, a textile technologist and project officer for the First Attack Firesuit.

"The concept [of the new firesuit] is to get to the fire at an early stage and decrease damage and loss because of speedy deployment of the suit," he said. "We plan on hanging the suits along the ship where any sailor can use them. We expect every sailor to be able to be a firefighter."

By contrast, the standard firesuit is now stored in three rooms aboard the ship. When the alarm is sounded, firefighters head to the fire locker to get dressed and then move to the fire, which by then may have grown much larger, according to Winer. The new firesuit will allow the nearest sailor to don the suit and put out the fire.

This capability is possible due to the firesuit's two convenient sizes instead of the standard firesuit's 18 sizes. Winer estimated that 75 percent of the population will fit into the smaller size with the rest fitting into the larger size. Velcro fasteners around the waist adjust leg length for a better fit. Once removed from the pocket bag, sailors simply pull the new firesuit over their heads and close the zipper that starts at one ankle, follows an arc peaking along the stomach and then stops at the other ankle.

The suit material is composed of a filament slick liner to slide more easily over clothing, an intermediate barrier and outer



Once unfolded and slipped over a sailor's uniform, the suit is zipped following an arc from one ankle to the other. Total donning time is about 60 seconds.

shell made from the latest fire-resistant fabrics. It comes with an attached hood, attached thumb wristlets and a back cargo pocket. Loops for hanging the suit are stitched to the bag, and gloves are included separately. Compared to the standard suit, the new firesuit is expected to cost 40 percent less and weigh 5 pounds instead of 8.5 pounds. "Flame and heat protection of the material is slightly lower, but the difference is negligible," commented Winer.

"It's almost like a big sack pulled over you. That gives you a lot of trapped air, which is good for insulation from the fire and heat," he said. "It's best if it's a loose suit. The old suit is a form-fitting garment and can't be packed up."

A coverall-style firesuit is desirable because the clothing is less likely to get caught in the confined spaces shipboard, and it restricts hot air and gases that might enter with a two-piece garment. Two different dark-colored pockets will be used to indicate the two sizes, and the firesuit will be labeled with reflective lettering that glows in the dark to aid visibility if the lights go out.

Firefighters aboard a fire research ship evaluated the new suits last year, and designers are preparing for the final laboratory demonstration with instrumented thermal manikins, followed by another demonstration on the fire research ship in the near future. Winer said everyone

preferred the First Attack Firesuit to the standard firesuit. The lower weight contributes to improved comfort, which reduces the amount of stress on firefighters. Although designers wanted few frills, they provided the cargo pocket on request.

"In testing, the firefighters said they felt no heat," Winer continued. Initial firesuit fielding is expected to begin in about a year.

One technology that might be adopted is reflectivity built into the outer-shell fabric to replace reflective stripes attached along the arms, legs and torso. Winer said the fold-into-its-own-pocket design, unique for any piece of protective clothing, draws initial disbelief, but it soon wins over naysayers.

"When firefighters first see it, they say 'Oh no,' but when they wear it, they fall in love with it," Winer concluded.

For more information about the Navy Clothing and Textile Research Facility or the U.S. Army Soldier Systems Center, please visit the Web sites at <http://www.navy-nex.com/command/nctrf/nctrf-index.html> and <http://www.natick.army.mil>.

### Scientist Honored by Army Engineers

Stuart Leigh, Deputy Director of the Countermine Division of the Communications-Electronics Command Research, Development and Engineering Center's Night Vision and Electronic Sensors Directorate was honored by the Corps of Engineers Association with the de Fleury Bronze Medal for outstanding service to the U.S. Army, the Corps of Engineers and the Engineer Regiment.

The medal was established by the Engineer Regiment as an award for the values demonstrated by the man for whom it was named, LTC Francois Louis de Fleury, a French engineer volunteer to the Continental Army. The award has been presented every year since 1989 to outstanding individuals.

In the citation, Chief of Engineers LTG Robert Flowers praised Leigh's work as an integral part of the team responsible for the recent fielding of a much-improved mine detector. This detector, the Hand-Held Standoff Mine Detection Sensor, is described as a "quantum advancement" in counter-mine systems and is the first hand-held detector deployed that finds both metal and plastic mines in all soil types.



## TARDEC Develops Water From Exhaust

*Paul D. Mehney*

In extreme conditions, the average soldier requires 3 gallons of water per day to prevent dehydration — which amounts to nearly one third of the Current and Future Force's daily sustainment requirement. U.S. Army Tank-Automotive Research, Development and Engineering Center (TARDEC) researchers are developing and testing innovative water-purification, generation and recovery technologies to reduce the logistical footprint of large-scale water use.

Reducing water logistics is achieved by pursuing two complementary objectives. First, develop advanced water-purification technologies that are more energy efficient, lightweight and compact than current systems. Second, generate and recover potable water from alternative sources such as vehicle exhaust or ambient air.

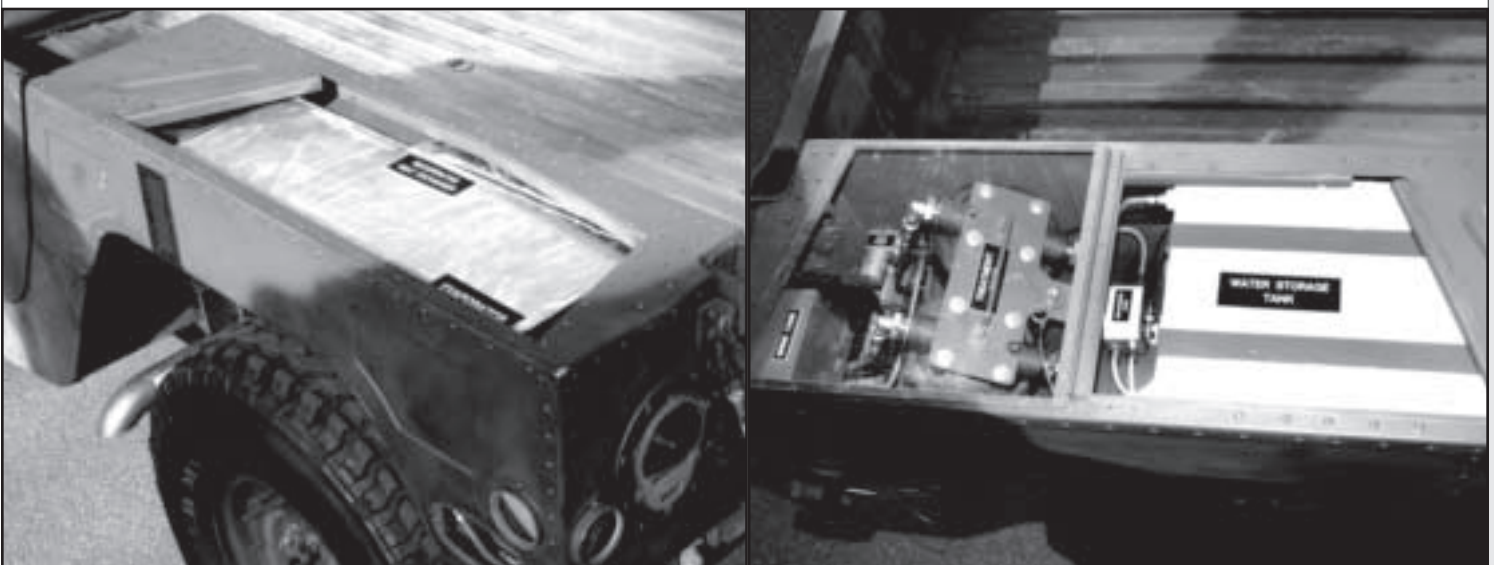
The water-from-exhaust system is undergoing development in a standard Humvee for Current Force needs and integration into the Future Combat Systems (FCS) Lancer Test Demonstrator for Future Force requirements. Mounted in a standard military Humvee, the water-from-exhaust system, jointly developed by TARDEC and industry partners, Lexington Carbon Company LLC and Hamilton Sundstrand, is capable of producing about 0.5-0.6 gallons of clean drinking water per gallon of fuel consumed.

According to TARDEC's water-from-exhaust system manager, Dr. Jay Dusenbury, "The water-from-exhaust system concept is based on water formed during the combustion process as the hydrogen present in fuel is oxidized by the oxygen present in air. The result is water in the exhaust." On the test Humvee, the water-from-exhaust unit is mounted in the vehicle's wheel wells. One side contains a heat exchanger that lowers the temperature of the exhaust and the other side contains a water-purification system. The reduced heat exhaust is then pumped into an evaporative cooler where the temperature is further lowered to a point where water condenses.

From there, the condensate — which resembles muddy water and smells of diesel — is sent to a small receiving tank before being pumped to the vehicle's other side where a water-purification system awaits. The filter, capable of treating up to 150 gallons of water and easily exchangeable in the field, uses particle filtration, granular-activated carbon, ion exchange resin and a MIOX-mixed oxidant generation system to make the water drinkable. To monitor the filter's life, sensors are mounted inside the vehicle's crew compartment, allowing Soldiers to control the system.

Once enough potable water is present in the on-board storage tank, Soldiers can draw water from a tap located near the vehicle's rear passenger side.

The purified water has been tested by an independent Environmental Protection Agency (EPA) certified laboratory for EPA priority pollutants. None of these contaminants has been found to exceed the drinking water standard. The Army Surgeon General's Office is conducting health and risk



TARDEC researchers are developing a water-from-exhaust system that generates and recovers potable water from vehicle exhaust. The system consists of a heat exchanger (left) and a water-purification system (right) mounted in the test Humvee's wheel wells.